

DOCUMENT RESUME

ED 346 846

IR 015 639

AUTHOR Hart, Russ A.; And Others
TITLE Establishing Rural ITFS Distance Education Programs:
The California State University, Fresno
Experience.
PUB DATE 7 Feb 92
NOTE 19p.; Paper presented at the Annual Conference of the
Association for Educational Communications and
Technology (Washington, DC, February 5-9, 1992).
PUB TYPE Viewpoints (Opinion/Position Papers, Essays, etc.)
(120) -- Reports - Descriptive (141) --
Speeches/Conference Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Networks; *Distance Education; Educational
Planning; *Educational Television; Electronic Mail;
Evaluation Criteria; Higher Education; Needs
Assessment; *Program Administration; Program
Implementation; Rural Areas; *Staff Development;
Teaching Methods; Telecommunications
IDENTIFIERS California State University Fresno; *Instructional
Television Fixed Service; *Organizational
Readiness

ABSTRACT

The planning and implementing of a rural instructional television fixed service (ITFS) distance education program at California State University-Fresno (CSUF) is described. The three important functions of establishing a distance education program within a learning institution are addressed: . telecommunications networking, management infrastructure, and faculty development. Communication between the learner and the teacher is the central issue in distance education and is the element that distinguishes distance learning program development from other types of educational administration. Criteria for a technological needs assessment of telecommunication networks for distance education are discussed. "Organizational readiness" at an educational institution--the cognitive understanding, the psychological acceptance, and the purely administrative structures--is addressed and classroom instructional strategies that are adaptable to the interactive television medium are surveyed. Inaugurated in 1987, the CSUF distance learning program has offered 10 or more credit courses each semester to 17 remote sites in the 4-county service area. (15 references) (Author)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

**ESTABLISHING RURAL ITFS DISTANCE EDUCATION PROGRAMS:
THE CALIFORNIA STATE UNIVERSITY, FRESNO EXPERIENCE**

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☐ This document has been reproduced as
received from the person or organization
originating it.

☐ Minor changes have been made to improve
reproduction quality.

• Points of view or opinions stated in this docu-
ment do not necessarily represent official
OERI position or policy.

ED346846

Presenters

Telecommunication Networking

Russ A. Hart

Instructional Telecommunication Center

**Management Infrastructure—
"Organizational Readiness"**

Patricia B. Hart

Division of Extended Education

Designing Distance Education Courses

Otto E. Benavides

School of Education

Paper presented at

The Association for Educational Communication and Technology Conference

Washington, D. C.

February 5-9, 1992

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

Russ A. Hart

12015639

Abstract

The planning and implementing of a rural instructional television fixed service (ITFS) distance education program at California State University—Fresno (CSUF) is described. The three important functions of establishing a distance education program within a learning institution are addressed: telecommunication networking, management infrastructure, and faculty development. Communication between the learner and the teacher is the central issue in distance education and is the element that distinguishes distance learning program development from other types of educational administration. Criteria for a technological needs' assessment of telecommunication networks for distance education are discussed. "Organizational readiness" at an educational institution—the cognitive understanding, the psychological acceptance, and the purely administrative structures—is addressed. Classroom instructional strategies that are adaptable to the interactive television medium are surveyed. Inaugurated in 1987, the CSUF distance learning program has offered ten or more credit courses each semester to 17 remote sites in the four-county service area.

ESTABLISHING RURAL ITFS DISTANCE EDUCATION PROGRAMS: THE CALIFORNIA STATE UNIVERSITY, FRESNO EXPERIENCE

Telecommunication Networking

Russ A. Hart, Ph. D.

Establishing a Distance Education Program includes addressing three important functions within a learning institution—telecommunication Networking, management infrastructure, and faculty development. How the learner and teacher communicate is the most central issue in distance education. What distinguishes distance education from other types of education is the form of this communication. Direct instruction by face-to-face communication with the teacher is how the learner receives information in conventional education. Conversely, the distant learner receives instruction through a variety of communications' media (Saba, 1989). Most recently, the mode of choice has been a form of telecommunication networking (Wagner & Reddy, 1989; Zemke, 1986).

In order to establish a telecommunication network for distance education, a technological needs assessment is required to be conducted by the learning institution. Pinsel (1988) and the U. S. Office of Technology Assessment (1989) have discussed a variety of technologies being used by school in the United States. Criteria in the technological needs' assessment would include environment and resources. The environment would be assessed in terms of geographic size and terrain as well as existing telecommunication systems. Resources would include financial as well as personnel assets. Only once these areas have been defined may an appropriate decision be reached as to the most feasible telecommunication network: Satellite, point-to-point microwave, Instructional Television Fixed Service (ITFS), compressed video, computer, telephone, Integrated Service Digital Network (ISDN) or some combination. Using the California State University, Fresno four-county service area as an example, a technological needs' assessment decision-making model for telecommunication networking will be developed.

Distance education need not be constrained by established systems. When a system of distance education is designed, all aspects of the educational process must be considered and addressed, including the technology to mediate communication between teacher and student (Garrison, 1989). Mediated interaction can take a variety of forms depending on the technology used to bridge the space-time gap between the learner and the instructor. Existing and emerging communications technologies are being readily accepted in distance education.

Audio Interaction

Examples of audio interaction include telephone conversations, and audio telelectures using regular telephone lines or special audio arrangements between the originating and the receiving sites. In addition, conferencing services are readily available from virtually every telephone company and some private services. Participants on both sites can interact by conversing back and forth. One of the strong advantages of audio teleconferencing is its technological familiarity and simplicity. While in a specific situation audio teleconferencing may be considered the primary communication and delivery technology, invariably the learning transaction is dependent upon print materials to deliver much of the course content.

Audiographic Interaction

In the audiographic type of interaction, the participants are provide with still visuals related to the topic of discussion. Audiographics refers "to the transmission of graphics and text information over a narrowband telecommunications channel, such as a telephone line" (Olgren & Parker, 1983, p. 321). Three common types of audiographics are facsimile, slow-scan television, and telewriting. The facsimile system is used to transmit any form of visual information (print or images) affixed to a piece of paper, reproducing a similar hard copy at remote locations. Although facsimile systems are a useful and common device, facsimile does not integrate well into a natural and continuous learning process when used in real time. The slow-scan television system may be somewhat more flexible than the facsimile system, but it normally takes more than thirty seconds to send the signal which also may adversely affect the natural pace of a distance education class. Problems may also arise if copies of an image are need for each participant.

Telewriting in distance education is comparable to the blackboard and overhead projector in the traditional classroom setting. While there are many methods of telewriting, the most versatile system is the electronic tablet. At normal writing speeds, information is transmitted and received at the rate generated. The system may be made fully interactive with participants adding to the image or creating their own. One of the more promising aspects of the newer systems is that both voice and data can be transmitted concurrently along a single telephone line. The capabilities of telewriting may be greatly expanded when integrated with a microcomputer system. Additional capabilities which may be produced are creation of computer graphics, computer conferencing and messaging, computer assisted learning, and a variety of other add-ons such as Videotext.

Video Interaction

True video conferencing provides for a two-way exchange of both live television images and audio signal between two or more sites and three or more individuals. The major disadvantage of such a system is the enormous technological problems that arise as the number of sites increase. To avoid this, the more common approach is one-way video and two-way audio where the students can see the teacher but the teacher cannot see the students. Typical arrangements for one-way video and two-way audio systems include ITFS, microwave, satellite, and cable transmission systems for primary video and audio distribution and telephone lines for recipients to relay their feedback through call-in phones.

A two-way full-motion live video interaction is the most sophisticated and expensive system of teleconferencing. Both parties have television cameras, transmission, and television receiving devices. The microwave or fiberoptic transmission lines are permanently installed between the points of origination and reception, or two cable television channels are assigned to the event or satellite dishes are temporarily or permanently installed to allow transmission and reception of both audio and video signals. If, as is the case in fully interactive two-way video, students may see the teacher and the teacher can see the students, then the educational transaction at a distance is virtually identical to a traditional classroom setting. This is a very powerful and attractive attribute of video teleconferencing for distance education.

Another technological medium requiring some discussion is compressed video. Video signals traditionally have been transmitted in analog form and therefore required a broad bandwidth. To reduce the bandwidth and consequently transmissions of full-motion video, CODECs (coder/decoder) were developed to compress video signals by converting them from analog to digital form. Redundant information is eliminated by means of algorithmic processing before being transmitted down a narrowband digital service telephone line. Depending upon the transmission rates, movement in the resulting picture may be disjointed and sometimes jerky. Transmission rates vary under the new Consultative Committee on International Telephony and Telegraph (CCITT) standard in multiples of 64 kbps (kilobytes per second) with 384 kbps and 768 kbps the most common and cost effective.

Computer Interaction

In computer mediated communication, information is transmitted between computers via telecommunication networks. Messages are in written form on a real time basis or posted to Bulletin Boards or E-mail systems. There may be varying degrees of delay

between sending a message and receiving a response. Because there is always some delay in composing and sending a response, computer mediated communication are viewed as being delayed or asynchronous. Computer conferences can be conducted in short time frames or over a period of days with participants signing on and off at their convenience. While there are many uses of computer conferencing (McCreary & Van Duren, 1987), it should not be seen as a replacement for other forms of teleconferencing or occasional face-to-face meetings.

With the recent development of an inexpensive CODEC circuit board that may be inserted into a personal computer (Kuzela, 1986), full motion color video conferencing may be conducted with hardware used for computer conferencing. The capability to digitize all forms of information will make it increasingly more difficult to distinguish between audio, video, and computer conferencing since they will all be computer based. The integration of telecommunications and microprocessors makes the boundaries between technologies less clear, but this is to be expected when one generation builds upon the other. Ideally, distance education technologies should be integrated into a well functioning delivery system.

The Institutional Environment

CSU, Fresno is the only public higher education institution in the central portion of the San Joaquin Valley that offers comprehensive degree programs to some 19,000 students. CSU Sister institutions including CSU, Stanislaus located to the north and CSU, Bakersfield to the south are both more than 100 miles distant and are considerably smaller in size. CSU Fresno is located in the heart of the richest agricultural area in the world between the Sierra Nevada and Coastal Mountain range. Fresno County alone produces over \$2 billion worth of agricultural products annually. The CSU Fresno service area is comprised of Fresno, Kings, Madera, and northern Tulare counties. According to 1990 census figures, this 14, 474 square mile region had a total of 1,168, 970 inhabitants of which over 600,000 live in the Fresno metropolitan area. This population is expected to grow more than 30 per cent by the year 2000. The region has a very diverse, multicultural, multiethnic population that now uses more than 70 different primary languages.

From 1980-82, a study of telecommunication carriers and other resources available for the University's use was undertaken. In order to learn which delivery systems originating from the campus were feasible, it was necessary to know which telecommunication commitments had been made in the central California area. Public telecommunication carriers had not made a strong commitment to new technology. No ISDN or fiber-optic services were envisioned for at least a decade with fiber-optic rings between central offices and cable television hub centers being proposed for 1995. At the end of 1982, after a television engineering study of the area had been completed and with the knowledge of

what was being done with the California State University System, an ITFS system was recommended to help satisfy the outreach needs of the University's service area. Following the engineering study which considered the land area, the mountainous terrain on either side of the valley, the location of communities to be served, the availability of frequencies, the relative construction and operation costs, and the recommendation that ITFS would provide the best outreach system, applications for two licenses groups were submitted to the Federal Communication Commission (FCC).

Following the FCC's 1983-85 freeze on applications and abortive efforts at consortia arrangements, an additional ITFS channel group was proposed that would allow for two high-powered repeaters. Located in the mountain ranges on either side of the valley, these two 50-watt repeaters would provide total coverage of the four-county service area. The FCC awarded the new license and modifications to the existing licenses in the summer of 1986. Transmitters and antennas were immediately ordered and construction began in January of 1987. After operational testing over the summer, the first televised courses were offered during the fall semester of 1987. Current course offerings have risen to 10 to 12 classes per semester to 17 receiving sites. Now that a recent University telecommunication upgrade project has installed an ISDN telephone switch and digital service, the foundation has been laid for expansion into two-way video technologies.

Management Infrastructure--"Organizational Readiness"

Patricia B. Hart, Ed. D.

While much discussion has been devoted to the technology of Distance Education, very little has addressed the need for "organizational readiness"--the cognitive understanding, the psychological acceptance, and the purely bureaucratic administrative structures that allow technology to facilitate learning (Moore & Thompson, 1990).

Cognitive understanding, the actual technical and logistical workings of a Distance Education program, as well as its philosophy for existence, is perhaps the easiest area to implement. Without the other two factors (psychological acceptance and bureaucratic structures), however, even fundamental cognitive issues are never clearly delineated, and therefore never really understood on an institutional level. Psychological acceptance, though somewhat harder to deal with than cognition, especially from a faculty perspective, will be forthcoming if the program is correctly designed and supported from the highest administrative levels.

Both institutional cognition and psychological acceptance, then, derive from the design and organizational structuring of a program. What this really means is the knowledge that **upper administration is behind the program and consequently bureaucratic forms will**

have to change (Hambelton, 1989). It is, in fact, these organizational policies, procedures, and habitual "ways of doing things" that make the difference between success or failure in a Distance Education program.

Institutions typically embrace the notion of being "high-tech." Often the rhetoric includes the need to reach out to underserved populations, to address the changing demographic picture of the modern student (i.e., adult, married, part-time, employed), and to better prepare an enlightened citizenry in an international, interdependent world. This rhetoric is used partially for its value as status in today's world and partially because there is some vague belief that technology can cure the ills of an overcrowded, underfunded and disorganized area called Education.

Those in charge of choosing technology, however, (i.e., which technology will best meet instructional needs), are seldom those who implement that technology (Shaeffer, 1990; Wagner, 1990). Rarely is an in-depth study of regional and national trends incorporated into the decision process. An "environmental scan" is usually a technological, not a demographic, need's assessment. Even more rare is the consideration of how existing policies and procedures are going to affect implementation (Moore et. al., 1990). Indeed, it is often the institution's need to maintain the status quo (with as little change as possible) that is paramount. Innovative technologies are expected to adapt to preexisting bureaucratic structures and administrative policies with little or no consideration of what adaptations might be needed from the institution itself. This results in "technology-driven content," misaligned components (e.g., budget, coordination, instruction, accountability) or **"A medium in search of a message."**

The term "infrastructure" is defined as "the underlying foundation or basic framework" (as of a system or organization). It is often used to describe the technical framework used for instructional delivery, (i.e., the hardware). The foundation of an organization, however, is not comprised of hardware. Rather, it is the infrastructure of **management systems** utilized by that organization to carry out its mission.

Typical management issues that are critical to the success of instructional technology but that are rarely scrutinized include:

- Centrality to academic core curriculum (Information flow, inclusion in central administrative meeting groups, recognized inherent educational value of courses, psychological and budgetary reinforcement from the highest levels)
- Administrative Units and budget issues (Who expends resources and who gains resources? What is the structural relationship between risk and benefit?)

- Contractual requirements and responsibilities to remote host sites (Who pays for what? How does this fit with host needs and constraints?)
- Admissions, Counseling and Registration policies & procedures
- Student support services at remote host sites (counseling, registration, Site Coordinator function)
- Course packaging adaptations (Condensed format, access at times & locations most appropriate for the student)
- Curriculum adaptation (Instructional Design)
- Faculty development, training, and incentives
- Evaluation (How is this working? What needs to be changed?).

Recently, this writer was a member of an Evaluation Team for certain "mainstream" state-supported programs. While these programs were not delivered via Distance Education, the criteria used for evaluation were generic to any quality program and reflected common standards that could be applied to any educational program. It is true that typical evaluation issues are addressed after--not before--implementation, but that practice is perhaps the very flaw that we are arguing against in this paper. It is logical to assume that if program quality is based on certain critical standards, then these same standards should be incorporated into a program during its initial design.

Some proposed standards and their related questions are:

I. Institutional Resources and Coordination

What is the overall purpose/rationale of the program?

How does the institution propose to support the program (e.g., General Fund, School/Departmental funds, Continuing Education)? What are the strengths and weaknesses of the proposed program support?

What are the contractual obligations of the host campus and what are the obligations of the receiving campus? How are these obligations to be delineated?

How is the program to be organized and coordinated (i.e., central academic administration, within a department, within a support unit)?

What policies regarding admissions, registration, and advising need to be changed to facilitate remote student needs?

II. Institutional Attention to the Program

How will this program be related to other units within the University?

What will be the links between Schools, Departments, Support units, remote sites and Central administration?

How will problems get solved?

Is there a grievance/appeal process? If so, where does it originate and how will it work for Distance Education?

III. Resources Allocated to the Program

Who makes budget decisions? Who is involved?

What policies are needed to guide budget development and change?

What are standard resources for faculty and how will those resources be included in this program?

What is the expected ratio of full-time to part-time faculty?

What faculty incentives should exist to ensure faculty participation?

Will courses follow the same calendar requirements as on-campus courses? Is condensed format a possibility? Will taped courses be allowed?

What type of assistance for instructional design will be provided to the faculty?

How is space allocated on campus? Off campus?

What has happened to academic support budgets in the last two years?

How will the library, media, and instructional support be provided for this program?

IV. Qualifications of Faculty

What are the hiring policies for this program for both full-time and part-time faculty?

What are the critical elements of a desirable faculty member for this program?

How are courses assigned to faculty? Who chooses whom?

V. Availability of Program Information

How is program information to be disseminated? What types of promotional materials will be used and what will a typical information packet look like?

How will potential students be identified and informed about the program, its benefits and rationale?

How will potential students be advised about course availability, applicability, and requirements, especially prerequisites?

How will faculty be informed about the program and its changes?

The California State University System recently formed a Commission on Instructional Technology which published its first report in January 1990. This Report stresses an integrated approach to technology in education and looks at Distance Education as a specialized form of delivering education. This is one of the first documents to acknowledge organizational and structural and processes as necessary components for successful implementation of educational programming. The CSUF Distance Education Program has been operating since 1987 under loosely-defined policies, marginal incentives, and little or no centralized support. The 1990 Report, however, calls for a need to "rethink and refocus" the organizational schemes within the CSU in an effort to achieve a more comprehensive administrative structure. It is hoped that a rethinking will indeed occur and a new focus will be placed on Distance Education. For those institutions that have not as yet decided on a technological delivery system, these issues should help bring to the fore those structural and policy matters that are critical to success. For those institutions already in the implementation stage, these issues might help in the refocusing effort so that Distance Education Programs may make a smooth transition into mainstream education and come closer to reaching their potential.

Designing Distance Education Courses

Otto E. Benavides, Ed. S.

In the process of establishing a distance learning service, various technologies must be considered as a medium to deliver instruction. As important as it is to consider the medium for delivery, it is also important to adequately design the format in which instruction and interactions are going to occur.

The lecture format is the first element to consider. The traditional method of lecture used in the classroom cannot necessarily be used for distance learning. The format for lecture delivery must be designed taking into consideration the medium used, the audience to be reached, and the type of involvement expected of the audience. A passive audience using a medium such as television will only contribute to boredom. The lack of eye to eye contact with the audience must be accounted for in planning the lecture. The teleinstructor will have to look at a TV camera and maintain eye contact with the camera as a way to convey personal contact to the audience.

A second element in the design of a distance learning class is the time concept. This is a very important element in the planning process. The distance learning instructor is constrained by time. Time must be used wisely and dynamically.

Another element in the design of the distance learning class is the use of the medium. The instructor in the traditional classroom may not have access to many media and technology. The Distance learning instructor will find many technological advances which can be readily applied for the delivery of instruction.

Pre-class activity is another element of the distance learning class. Although pre-class activities are not unique to distance learning instruction, the planning for these activities will be different and must be carefully planned.

In-class activities require special attention, particularly since the instructor cannot be present to assist the student directly. However, if two-way audio is available, it will facilitate directing the student and obtaining feedback.

Post-class activities are similar to the activities developed for after instruction in the regular classroom. However, the method for collecting assignments, and the way to provide feedback will present a different challenge to the distance learning instructor.

The Lecture

Planning a lecture for distance learning instruction is not any different from planning any other lecture. First of all, the instructor must have some clear goals in mind. These goals must be written for the various units of instruction for a telecourse. Objectives for each lesson will be expressed in terms of expected student performance after instruction. The planning for the delivery of the lecture should include: selection of materials and resources to be used. This selection must be done with careful consideration of the effectiveness of the medium. It is necessary to select materials and resources to which students will have access during and after instruction. Materials and resources that can be used in distance learning include videotapes or films, handouts, computer based activities, interactive media or multimedia, other printed material, and auxiliary support materials.

Planning for the lecture should include testing procedures. Testing materials can be selected based on what will be available in the classroom.

The Time Concept

Time on television seems to be longer than real time. For this reason a careful planing of the use of time is necessary to maintain student interest at all times. Avoiding the use of talking heads and mixing activities as suggested above is a good technique to utilize time. It is recommended to change activities to maintain students' interest. Various activities should be planned for the duration of the lecture. It is recommended that the presenter return to the screen from time to time to make the lecture more personable. A session of questions and answers should also be included for every session.

Use of the Medium

The television medium for distance learning is a live and dynamic one. Planning for the use of this medium requires a limitation on the use of talking heads to a maximum of 10-15 minute periods followed by demonstrations, video or film segments, student activities, use of handouts, display of graphics, and other activities. The use of only talking heads in a telelecture discourages student participation and attentiveness. It is a good idea to ask students when they sign-up for a telecourse at off-campus sites to provide an index card with biographical information and to add their photograph to the card. This will make the process more personal for the teleinstructor and the other students. The students will be able to see the instructor, but without a visual image of the student, the instructor is limited to only the audio recognition of the student's voice.

Interactivity

The selection of strategies which allow for interactivity during the delivery of the lecture is an essential element of planning the distance learning classes. Such strategies may include note taking, role playing, simulations, class discussions, quizzes and others. Planning for interactivity will be more time consuming, and it will require more forethought. How are activities going to be conducted? What materials will the students have available for interactive learning? Are the facilities at the site equipped with the appropriate resources? Is their access to two-way video or two-way audio to monitor the activities? Have the materials been mailed before the intended day of lecture? Since the television medium provides one-way video for the most part, the use of interactive strategies becomes very important to maintain audience attention during the telelecture. Plans to utilize print materials for audience interaction during the lecture are one way to involve the students in the lecture process. Discussion of topics presented by the instructor at regular intervals or the discussion of videotaped segments via audio feedback could be another method to involve the students. Perhaps group discussions followed by reports via audio can be implemented at various times during the course. As long as the audience is involved interactively, success of the telelecture can be predicted.

Pre-Class Activities

In order to prepare the students for the lecture, reading assignments are recommended as background information for the lecture. Students reading the given assignments will be better prepared for the telelecture and will be more involved in the process. Students can also be given research assignments related to future topics of discussion, or they may be asked to preview a film, video, or other medium to be later discussed in class.

In-Class Activities

The in-class activities include the lecture itself, games and simulations which can be directly controlled by the instructor via audio if no two-way television is available, reading assignments followed by discussion, computer assisted programs, viewing videotaped materials, discussion of assigned topics, quizzes and tests.

Post-Class Activities

The typical homework assignments can be given to students taking distance learning courses. Students can be given assignments to write papers, complete summaries of discussed topics, or complete evaluations for the class.

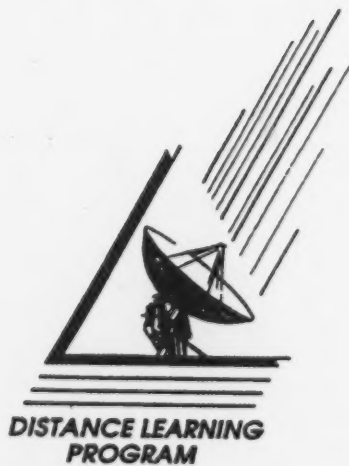
All these elements must be considered for inclusion in the panning and delivery of distance learning instruction. The distance learning lecture must remain dynamic and interactive.

References

- CSU Commission on Instructional Technology. (1990). The Student, the Faculty, and the Information Age: The Power of Technology. The California State University (Commission Report No. 1). Long Beach, CA: Author.
- Garrison, D. (1989). Understanding Distance Education. New York: Routledge.
- Hambelton, B. (1989, April). Planning and Implementing Distance Learning Technologies. Paper presented at the Learning by Satellite Conference, Tulsa, OK.
- Kuzela, L. (1986, November 24). A video conference at your desk? Industry Week, p. 72.
- McCreary, E. & Van Duren, J. (1987). Educational applications of computer conferencing. Canadian Journal of Educational Communication, 16, 107-115.
- Moore, M., & Thompson, M. (1990). The Effects of Distance Learning: A Summary of the Literature. American Center for the Study of Distance Education (ACSDE) Research Monograph (Whole No. 2).
- Olgren, C. & Parker, L. (1983). Teleconferencing technology and application. Dedham, MA: Artech House Inc.
- Pinsel, J. (1988). Distance Learning: A Summary of Telecommunications Efforts Involving Education Service Agencies and Others. Arlington, VA: American Association of Education Service Agencies.
- Research and Practice. Symposium conducted at the NUCEA Annual Conference, New Orleans, LA.
- Saba, F. (1989). Integrated Telecommunications Systems and instructional transaction. In Michael G. Moore and G. Christopher Clark (Eds.) Readings in Principles of Distance Education, No. 1. Pennsylvania State University, University Park.
- Shaeffer, J. (1990, April). Technology: Who Is Making the Choices? In Interaction in Distance Education--Linking
- U. S. Office of Technology Assessment. (1989) Linking for learning: A new course for education, OTS-SCT-430. Washington, D.C.: U.S. Government Printing Office.

- Wagner, E. (1990, April). From practice to theory to practice: A Review of Research Affecting Interaction in Distance Education. Paper presented at the NUCEA Annual Conference, New Orleans, LA.
- Wagner, E. & Reddy, N. (1989). Design Considerations in Selecting Teleconferencing for Instruction. In Michael G. Moore and G. Christopher Clark (Eds) Readings in Distance Learning and Instruction, No. 2. Pennsylvania State University, University Park.
- Zemke, R. (1986). The rediscovery of videoteleconferencing. Training, 23(9): 28-43.

DISTANCE LEARNING PROGRAM SITES 1991-92



California State University, Fresno
Service Area